



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION IX  
75 Hawthorne Street  
San Francisco, CA 94105

Memorandum

Subject: Annual Monitoring Network Plans

From: Matthew Lakin, Chief  
Air Quality Analysis Office, Air Division, Region 9

To: Region 9 Air Pollution Control Agencies

This document outlines the information that is required to be submitted to EPA Region 9 as part of the Annual Monitoring Network Plans due ~~annually~~ by July 1<sup>st</sup> of each year. We thank you for the time and attention you pay each year while developing these documents. The plans allow the public and EPA to understand your monitoring network, and provide an opportunity for agencies to reflect on their existing networks.

Over the years, many agencies have refined their plans and added information to create a more comprehensive picture of their monitoring networks. Recently, it has become apparent that a lack of detail in these network plans may result in legal vulnerabilities. Lack of information sufficient to determine ~~network adequacy~~ compliance with 40 CFR Part 58.10 may therefore result in EPA's disapproval of all or a portion of a plan. Given this new attention to network plans, we thought it appropriate to send an update to EPA Region 9's "Annual Monitoring Network Plan for 2007" memo. This updated memo provides information reflecting changes in regulation since 2007, and highlights plan elements that are not always addressed to the desired level of detail. We recognize that this memo is being sent only a few months before plans are due, and that agencies typically produce plans well ahead of July 1<sup>st</sup> in order to provide time for internal review and public notice and comment. We hope that you will be able to address the elements noted in this memo this year in your plans submitted this year, and will ~~be looking forward to~~ expect that all elements ~~to be~~ will be addressed next year in plans submitted in 2013.

In addition, an Annual Monitoring Network Plan template and CFR Elements appendix are attached. The template provides an optional network plan format that incorporates elements required to be included in network plans, including an example detailed site information table that includes required site-level information. State and local agencies are not required to follow this exact format, but must ensure that their network plans cover all required information outlined in the template and the appendix. EPA strongly encourages all agencies to, at a minimum, include the tables suggested in the template. The appendix provides the regulatory basis for the annual network plan. Agencies are also encouraged to include any additional information that describes their air ambient air monitoring network.

**Comment [KH1]:** Or we could cite Appendices A, C, D and E. I think saying network adequacy introduces a term we're not ready to define. I think we've said to CARB that we don't expect new information for network adequacy in terms of proving high concentration sites or other network distribution elements.

## Specific Section Notes

EPA has noticed that the following plan elements are not always addressed to the desired level of detail:

- Minimum Monitoring Requirements. Agencies should provide the information detailed in the attached table, including information on design values and CBSAs/MSAs.
- Collocation. It is often difficult to tell from reading network plans whether collocation requirements are being met. See attachments for collocation requirements and suggestions for how to address these requirements in your network plans.
- Detailed Site Information tables. While all agencies have included site information tables, often information is missing, or the incorrect type of information is provided. See attachment, and specific examples listed below.

- Monitoring objective, site type, monitor type, method code parameter code and POC should be included for each monitor.
- Sampling Frequency for PM<sub>2.5</sub> and PM<sub>10</sub> sites. Sampling frequencies should be determined in accordance with 40 CFR 58. For easy reference, EPA is enclosing attachments that describe how sampling frequency should be determined for each site.
- PM<sub>2.5</sub> information. When filling out the detailed site information tables, please ensure that your PM<sub>2.5</sub> information is correct. This includes information clearly identifying on method code, FEM/FRM/non-FEM/non-FRM status, which monitors are meeting collocation requirements, continuous versus filter-based instruments, FEM/FRM/non-FEM/non-FRM, and whether data are comparable to the NAAQS. If an FRM or FEM monitor is designated as not comparable to the NAAQS (specified by a non-regulatory monitor type in AQS), regulatory or non-regulatory, please provide adequate justification for choosing this monitor type (see attachments).

In addition, there have been many changes to monitoring requirements since 2007. The specific requirements as of February 2012 are included in the CFR Elements appendix (attached).

General changes include new:

- NCore requirements (stations operational by January 1, 2011)
- Pb requirements: source-oriented (1.0 tpy or greater – monitors by January 1, 2010; 0.50 tpy – monitors by December 27, 2011), airport study monitors (by December 27, 2011), at urban NCore stations (population of 500,000 or greater – by January 1, 2012)
- SO<sub>2</sub> requirements (operational by January 1, 2013)
- NO<sub>2</sub> requirements (address in July 1, 2012 plan)
- CO requirements: in CBSAs of 2.5 million persons or more (address in July 1, 2014 plan); other CO monitors (address in July 1, 2016 plan)

## Attachments

**Comment [KH2]:** Elfego suggests changing this header to “Recurring Deficiencies in Annual Network Plans” – which seems too harsh – but I agree that I don’t know if specific section Notes makes sense to those outside our discussions. Does this need a header?

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Attached are several documents outlining requirements and providing clarification on specific plan elements. State and local agencies are not required to include the exact tables included in the attachments, however, EPA strongly encourages all agencies to include the tables. Regardless of how the information is presented, agencies must ensure that their network plans include all required information. The appendix provides the regulatory basis for the annual network plan. Agencies are also encouraged to include additional information that describes the ambient air monitoring network. [Attachments:](#)

- Outline of CFR Requirements
- Site and monitor type description
- [Minimum monitoring requirements table](#)
- [Detailed site information table](#)
- [Minimum monitoring requirements table](#)
- Sampling frequency information – PM<sub>10</sub> and PM<sub>2.5</sub>
- [PM<sub>2.5</sub> Reference Memos](#)
- Collocation information for PM<sub>10</sub>, PM<sub>2.5</sub>, and Pb
- [PM<sub>2.5</sub> Reference Memos](#)
- [Template for minimum monitoring requirements table](#)
- [Template for detailed site information table](#)
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**Comment [KH3]:** Trying to arrange these somehow – went for a basic info than tools for agencies approach  
Feel free to change back

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#### **General Network Plan Overview**

**Comment [KH4]:** Elfego asks if we agreed to delete this

**Submittal date:** States must submit an annual network plan on July 1, 2007 to the Regional Administrator.

**Public Inspection/Comment:** The annual monitoring network plan must be made available for public inspection (website, hardcopy posting in libraries and public offices, and/or newspaper listing) for at least 30 days prior to submission to EPA. Although not required, EPA recommends soliciting comments concurrent with the public inspection period. Evidence of public inspection must be submitted. If an opportunity for public comment had been provided, comments received must be included in the annual network plan submission.

**Types of Monitors to include in plan:** Include establishment and maintenance of an air quality surveillance system that consists of the following:

1. SLAMS
2. FRM
3. FEM
4. ARM
5. NCORE
6. STN
7. PAMS
8. SPM

**Network modifications:** A network plan that proposes SLAMS network modifications including new monitoring sites is subject to the approval of the EPA Regional

Administrator [according to 40 CFR 58.14. If you are requesting approval for modifications as part of your network plan, please include a demonstration of how the criteria in 40 CFR 58.14 are met.](#)

We look forward to your network plan submittals. Please contact myself, Matt Lakin, at 415.972.3851 or [lakin.matthew@epa.gov](mailto:lakin.matthew@epa.gov), or any of my monitoring team staff, should you have any questions, or should you desire a copy of the 2007 memo EPA Region 9 sent regarding network plans.

### Minimum Monitoring Requirements.

This network meets the minimum monitoring requirements for all criteria pollutants (Tables 2, 3, 4, 5).

### Ozone

(Note: Refer to section 4.1 and Table D-2 of Appendix D to Part 58)

Table 2. Minimum Monitoring Requirements for Ozone.

MSA	County(ies)	Population (year)	8-hour Design Value, DV years, and DV site	Min. # Monitors Required	# Monitors Active	Monitors Needed

Monitors required for SIP or Maintenance Plan:

### PM<sub>2.5</sub>

(Note: Refer to section 4.7 and Table D-5 of Appendix D to Part 58)

Table 3.1. Minimum Monitoring Requirements for PM<sub>2.5</sub>.

MSA	County(ies)	Population (year)	Annual Design Value, DV years, DV site	Daily Design Value, DV years, DV site	# SLAMS Monitors Required	# SLAMS Monitors Active	SLAMS Monitors Needed

Table 3.2. Minimum Monitoring Requirements for continuous PM<sub>2.5</sub>.

MSA	County(ies)	Population (year)	Annual Design Value, DV years, DV site	Daily Design Value, DV years, DV site	# Continuous Monitors Required	# Continuous Monitors Active	Continuous Monitors Needed

Monitors required for SIP or Maintenance Plan:

### PM<sub>10</sub>

(Note: Refer to section 4.6 and Table D-4 of Appendix D to Part 58)

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Table 4. Minimum Monitoring Requirements for PM<sub>10</sub>

MSA	County(ies)	Population (year)	Design Concentration *	# Expected Exceed-ances, years, site	Min. # Monitors Required	# Monitors Active	Monitors Needed

\*PM10 SIP Guidance (EPA-450/2-86-001):

<http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P1006IKV.txt>

Monitors required for SIP or Maintenance Plan:

**NO<sub>2</sub>**

(Note: Refer to section 4.3 of Appendix D to Part 58)

Table 5. Minimum Monitoring Requirements for NO<sub>2</sub>

MSA	County(ies)	Population (year)	Annual Design Value, DV years, DV site	1-hour Design Value, DV years, DV site	# Monitors Required	# Monitors Active	Monitors Needed

Monitors required for SIP or Maintenance Plan:

Monitors required for PAMS:

**SO<sub>2</sub>**

(Note: Refer to section 4.4 of Appendix D to Part 58)

Table 6. Minimum Monitoring Requirements for SO<sub>2</sub>

MSACBSA	County(ies)	Pop. (year)Popu lation (year)	Ann. Design Value, DV years, DV siteTotal SO <sub>2</sub> (tons per year)	1-hour Design Value, DV years, DV sitePopulat ion Weighted Emissions Index (PWEI)	# Monitors Required	# Monitors Active	Monitors Needed

Monitors required for SIP or Maintenance Plan:

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## CO

(Note: Refer to section 4.2 of Appendix D to Part 58)

Table 7. Minimum Monitoring Requirements for CO

MSA	County(ies)	Population (year)	8-hour Design Value, DV years, DV site	1-hour Design Value, DV years, DV site	# Monitors Required	# Monitors Active	Monitors Needed

Monitors required for SIP or Maintenance Plan:

## Pb

(Note: Refer to section 4.5 of Appendix D to Part 58)

Table 8. Minimum Monitoring Requirements for Pb.

### NCORE Pb Monitoring

NCORE Site Name	CBSA	Population (year)	Min. # Monitors Required	# Monitors Active	Monitors Needed

### Source-Oriented Pb Monitoring (including airports)

MSA Source Name	County(ies) Address	Pop. (year) Pb Emissions (tons per year)	Emission Inventory Source & Data Year	Max 3- Month Design Value*	DV date (third month, year)	Min. # Monitors Required	# Monitors Active	Monitors Needed

\*most recent 2 years consider data from the past 3 years.

Monitors required for SIP or Maintenance Plan:

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Basic Monitoring Objectives (40 CFR 58 App. D 1.1)
(a) Provide air pollution data to public in a timely manner
(b) NAAQS comparison
(c) Research support

Acceptable AQS Coding for Site Types (40 CFR 58 App. D 1.1.1)
EXTREME DOWNWIND
HIGHEST CONCENTRATION
MAX OZONE CONCENTRATION
MAX PRECURSOR EMISSIONS IMPACT
POPULATION EXPOSURE
SOURCE ORIENTED
UPWIND BACKGROUND
GENERAL/BACKGROUND
REGIONAL TRANSPORT
WELFARE RELATED IMPACTS
QUALITY ASSURANCE
OTHER
Site types (monitoring objective types) can be found in the AQS coding manual (Section 5.4.8) at: <a href="http://www.epa.gov/ttn/airs/airsaqs/manuals/AQS%20Data%20Coding%20Manual.pdf">http://www.epa.gov/ttn/airs/airsaqs/manuals/AQS%20Data%20Coding%20Manual.pdf</a>

Acceptable AQS Coding for Monitor Types
IMPROVE
INDEX SITE
INDUSTRIAL
NATTS
NON-EPA FEDERAL
NON-REGULATORY
PAMS
PROPOSED NCORE
QA COLLOCATED
SLAMS
SPECIAL PURPOSE
SUPLMNTL SPECIATION
TRENDS SPECIATION
TRIBAL MONITORS
UNOFFICIAL PAMS
Monitor types can be found at: <a href="http://www.epa.gov/ttn/airs/airsaqs/manuals/codedescs.htm">http://www.epa.gov/ttn/airs/airsaqs/manuals/codedescs.htm</a>

Method Codes
Method codes (Protocols w/ Sampling Methodology) can be found at: <a href="http://www.epa.gov/ttn/airs/airsaqs/manuals/codedescs.htm">http://www.epa.gov/ttn/airs/airsaqs/manuals/codedescs.htm</a>

Parameter Codes
Parameter codes (Pollutant Codes) can be found at: <a href="http://www.epa.gov/ttn/airs/airsaqs/manuals/codedescs.htm">http://www.epa.gov/ttn/airs/airsaqs/manuals/codedescs.htm</a>

## PM<sub>10</sub> SAMPLING FREQUENCY ANALYSIS

(1) 40 CFR 50 APP. K 2.3 (a) explains the data requirements for demonstrating attainment with the NAAQS.

**40 CFR 58.12 specifies the required minimum frequency of sampling for PM<sub>10</sub>.** For the purposes of making comparisons with the particulate matter standards, all data produced by State and Local Air Monitoring Stations (SLAMS) and other sites submitted to EPA in accordance with the part 58 requirements must be used, and a minimum of 75 percent of the scheduled PM<sub>10</sub> samples per quarter are required.

(2) 40 CFR 58.12 (e) explains how and when sampling frequency should be considered.

For PM<sub>10</sub> samplers, a 24-hour sample must be taken from midnight to midnight (local standard time) to ensure national consistency.

**The minimum monitoring schedule for the site in the area of expected maximum concentration shall be based on the relative level of that monitoring site concentration with respect to the 24-hour standard as illustrated in Figure 1.**

**1.** If the operating agency demonstrates by monitoring data that during certain periods of the year conditions preclude violation of the PM<sub>10</sub> 24-hour standard, the increased sampling frequency for those periods or seasons may be exempted by the Regional Administrator and permitted to revert back to once in six days. The minimum sampling schedule for all other sites in the area remains once every six days. **No less frequently than as part of each 5-year network assessment, the most recent year of data must be**

**considered to estimate the air quality status at the site near the area of maximum concentration.** Statistical models such as analysis of concentration frequency distributions as described in "Guideline for the Interpretation of Ozone Air Quality Standards," EPA-450/479-003, U.S. Environmental Protection Agency, Research Triangle Park, NC, January 1979, should be used. Adjustments to the monitoring schedule must be made on the basis of the 5-year network assessment. The site having the highest concentration in the most current year must be given first consideration when selecting the site for the more frequent sampling schedule. Other factors such as major change in sources of PM<sub>10</sub> emissions or in sampling site characteristics could influence the location of the expected maximum concentration site. **Also, the use of the most recent 3 years of data might, in some cases,**

**be justified in order to provide a more representative database from which to estimate current air quality status and to provide stability to the network. This multiyear consideration reduces the possibility of an anomalous year biasing a site selected for accelerated sampling.** If the maximum concentration site based on the most current year is not selected for the more frequent operating schedule, documentation of the justification for selection of an alternative site must be submitted to the Regional Office for approval during the 5-year network assessment process. **Minimum data completeness criteria, number of years of data and sampling frequency for judging attainment of the NAAQS are discussed in appendix K of part 50 of this chapter.**

(3) Figure 1 in 58.12 illustrates the ratios for PM<sub>10</sub> sampling frequency

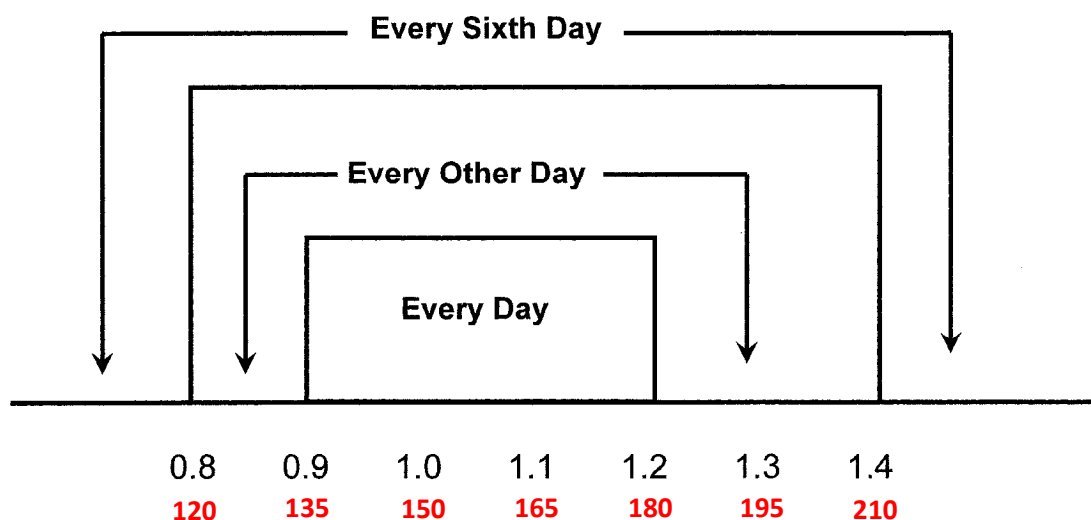


Figure 1 – Ratio to Standard

(4) After discussions with OAQPS, we have interpreted "relative level of that monitoring site concentration" (the 58.12 (e) language) to mean the "design concentration", as discussed in Section 6.3 of the PM<sub>10</sub> SIP Development Guidance (EPA-450/2-86-001).

## PM10 SAMPLING FREQUENCY ANALYSIS

(5) Table 6.1 of Section 6.3 in the guidance explains how to choose a "design concentration", which is based on the number of daily samples available for the three year period.

TABLE 6-1

TABULAR ESTIMATION OF PM<sub>10</sub> DESIGN CONCENTRATIONS

Number of Daily Values	Rank of Upper Bound	Rank of Lower Bound	Data Point Used for Design Concentration
$\leq 347$	-	1	Highest Value
348 - 695	1	2	Second Highest Value
696 - 1042	2	3	Third Highest Value
1043 - 1096	3	4	Fourth Highest Value

(6) For example, if the sampler is operating on a 1 in 6 day schedule, the "design concentration" would be the 1<sup>st</sup> max value in that dataset. This would then be compared to the following ratios in Figure 1 of 58.12 to determine the required sampling frequency (ratios are compared to the 24 hour standard,  $150 \mu\text{g}/\text{m}^3$ , which is rounded to the nearest  $10 \mu\text{g}/\text{m}^3$ )

### Ratio

135 – 180 = EVERYDAY

120 – 135 OR 180 – 210 = 1 IN 3

<120 OR >210 = 1 IN 6



#### PM<sub>2.5</sub> Sampling Frequency – 40 CFR 58.12

- 1-in-3 day schedule required for manual FRMs at required SLAMS stations
- Agencies may request approval from the Regional Administrator for a 1-in-6 day schedule for manual FRMs at required SLAMS stations which also have a continuous monitor operating.
- Must retain the 1-in-3 day schedule for the following required sites:
  - SLAMS that determine an area's design value and are within  $\pm 10$  percent of either the annual or the 24-hour NAAQS.
  - Required site that exceeded the 24-hour NAAQS at one or more times a year for three years.
  - A daily sampling schedule is required for required SLAMS that determine an area's design value and are within  $\pm 5$  percent of either the annual or the 24-hour NAAQS.

#### PM<sub>2.5</sub> Collocation – 40 CFR 58 Appendix A Section 3.2.5, 3.3.5

- Each FRM method designated as primary monitors
  - Collocate at 15 percent of monitors (values of 0.5 or greater round up)
  - Must have at least one collocated monitor per PQA0
  - Collocated monitor must be same method designation
- Each FEM method designated as primary monitors
  - Collocate at 15 percent of monitors (values of 0.5 or greater round up).
  - Half of collocated monitors must be FRMs and half must be FEMs of the same method.
  - The first collocated monitor must be an FRM.
  - If an odd number of collocated monitors are required, the additional monitor must be a FRM.
- Collocated FRM samplers are required to run on a 12-day sampling frequency.
- 80 percent of the collocated samplers should be located at sites within  $\pm 20$  percent of either the annual or 24-hour NAAQS.
- If an agency has no sites within  $\pm 20$  percent of either the annual or 24-hour NAAQS, 60 percent of the collocated monitors should be located at sites with annual mean concentrations among the 25 percent highest in the network.

#### PM<sub>10</sub> Collocation – 40 CFR 58 Appendix A Section 3.3.1

- Each manual method designation in the PQA0 must have 15 percent of monitors collocated
- Collocation for TSA and PM<sub>10</sub> samplers must be considered separately.
- Collocated sites must be within the highest 25 percent annual mean concentrations, unless alternatives are approved by the Regional Administrator.

### **Guidance memos for the use of continuous PM<sub>2.5</sub> monitors**

The following memo from July 24, 2008 describes how to integrate continuous FEM and ARM methods into a SLAMS network, including discussions of appropriate method evaluation periods and data usage. If operating FEMs that are considered non-regulatory, include a justification for this decision.

Implementing Continuous PM<sub>2.5</sub> Federal Equivalent Methods (FEMs) and Approved Regional Methods (ARMs) in State or Local Air Monitoring Station (SLAMS) Networks”.

<http://www.epa.gov/ttn/amtic/files/ambient/pm25/femarmslam.pdf>

The following memo from June 1, 2006 outlines how to report continuous PM<sub>2.5</sub> data to AQS, including parameter codes for both FEMs and non-FEMs. Please include these parameter codes in the detailed site information table and provide a justification for treatment of non-FEM data as either 88501 or 88502.

“Technical Note on Reporting PM<sub>2.5</sub> Continuous Monitoring and Speciation Data to the Air Quality System (AQS)”

<http://www.epa.gov/ttn/amtic/files/ambient/pm25/datamang/contrept.pdf>